What is claimed is:

1. Apparatus comprising a rotor, a stator, first and second axially spaced combinations each including at least one permanent magnet disposed on each of said rotor and said stator and polarized to levitate said rotor and further including an electrically energizable coil for modulating magnetic flux between said respective stator and rotor magnets, electrical circuitry for regulating electrical energy to said coils for stabilizing said rotor axially, and said rotor magnets being offset axially of said stator magnets respectively such that said rotor magnets are offset axially inwardly of said corresponding stator magnets or such that said rotor magnets are offset axially outwardly of said corresponding stator magnets.

2. Apparatus according to claim 1 wherein said electrical circuitry includes a first circuit for regulating electrical energy to said coils for maintaining an axial reference position of said rotor and a second circuit responsive to feed-back of electrical energy to at least one of said coils for modifying said axial reference position.

3. Apparatus according to claim 2 wherein said second circuit includes a comparator for comparing electrical energy to at least one of said coils with a reference electrical energy and an integrator of the differences therebetween.

4. Apparatus according to claim 3 wherein said reference electrical energy is about zero volts.

5. Apparatus according to claim 1 wherein said circuitry includes a rotor position sensor, a comparator for outputting a difference signal between a signal from said sensor and a

position reference signal, and a PID controller for receiving said difference signal and outputting electrical energy to said coils in response to said difference signal.

6. Apparatus according to claim 1 wherein said rotor magnets are offset axially outwardly of said stator magnets respectively.

7. Apparatus according to claim 1 wherein said rotor magnets are magnetized to repel said stator magnets respectively.

8. Apparatus according to claim 1 wherein said magnets are axially polarized.

9. Apparatus according to claim 1 wherein said magnets are magnet rings.

10. Apparatus according to claim 1 wherein each of said combinations comprises two of said rotor magnet which are polarized axially in opposite directions and two of said stator magnet which are polarized axially in opposite directions.

11. Apparatus according to claim 1 wherein said coil is positioned on said stator.

12. Apparatus according to claim 1 further comprising magnetic material in surrounding relation to said coil.

13. Apparatus according to claim 12 wherein said coil is positioned on said stator, the apparatus further comprising means defining an air gap between said magnetic material and said respective stator magnet.

14. Apparatus according to claim 13 further comprising magnetic material disposed alongside said stator magnet.

15. Apparatus comprising a rotor, a stator, first and second axially spaced combinations each including at least one permanent magnet disposed on each of said rotor and said stator and polarized to levitate said rotor and further including an electrically energizable coil for modulating magnetic flux between said respective stator and rotor magnets, a first electrical circuit for regulating electrical energy to said coils for maintaining a reference position of said rotor, and a second electrical circuit responsive to feed-back of electrical energy to at least one of said coils for modifying said reference position.

16. Apparatus according to claim 15 wherein said rotor magnets are offset axially outwardly of said stator magnets respectively.

17. Apparatus according to claim 15 wherein said second circuit includes a comparator for comparing electrical energy to at least one of said coils with a reference electrical energy and further includes an integrator of the differences therebetween.

18. Apparatus according to claim 15 wherein said reference electrical energy is about zero volts.

19. Apparatus according to claim 15 wherein said coil is positioned on said stator, the apparatus further comprising magnetic material in surrounding relation to said coil, means defining an air gap between said magnetic material and said respective stator magnet, and magnetic material disposed

alongside said stator magnet.

20. A method for bearing a rotor comprising providing first and second axially spaced combinations each including at least one permanent magnet disposed on each of the rotor and a stator and polarized to levitate the rotor, providing an electrically energizable coil for each of the combinations, regulating electrical energy to the coils for maintaining a reference position of the rotor, and modifying, in response to feed-back of electrical energy to at least one of the coils, the reference position.

21. A method according to claim 20 wherein the step of modifying the reference position comprises comparing electrical energy to at least one of the coils with a reference electrical energy and integrating the differences therebetween until a difference of about zero is attained.

22. A method according to claim 21 wherein said reference electrical energy is about zero volts.